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THE STATE OF ECONOMICS

by Sumner H. Slichter

ECONOMISTS develop five principal kinds of materials: (1) intellectual tools and concepts; (2) descriptions of specific situations represented by case and historical studies; (3) hypotheses; (4) economic models; (5) propositions which have some generality and which have been found to be consistent with more or less comprehensive bodies of evidence.

The intellectual tools and concepts consist of a multitude of definitions, supply and demand curves, indifference curves; various concepts of elasticity, such as elasticity of demand, of supply, of substitution, of expectations; distinctions between capital and income and between fixed and variable costs; the whole family of marginal concepts; isoquant curves, various conceptions of competition and monopoly, various notions of the flexibility of prices; such concepts as propensity to consume, the multiplier, liquidity preference, and a multitude of others. The intellectual tools and concepts represent the habits of thought of economists—the way in which they have found it useful to think about economic phenomena, the classifications which they have found helpful, the concepts which they have found fruitful in constructing hypotheses and models, the parts of mathematics and statistical methods which have been found useful in economic analysis.

The large volume of case and historical studies are useful in the main because they suggest concepts, hypotheses, or models, or because they yield evidence that helps to test the truth of propositions. A given case study cannot be expected to add much evidence in support of the truth of a given proposition, but it can show that a proposition is wrong, and it can be expected to yield many ideas.

Hypotheses and models fall in the realm of speculation. They are not sharply distinguishable. A hypothesis is a proposition which one has reason to believe may turn out to be "true," that is, one which may turn out to be consistent with a substantial volume of evidence. Models may be simply an elaborate form of hypothesis—some assumptions and some conclusions deduced to be consistent with the assumptions and regarded as probably true. Or a model may be an intellectual tool constructed as a step toward developing a hypothesis, or in order to develop new concepts or new tools of analysis.

In economics, as in other branches of thinking, it is convenient to develop hypotheses by a series of easy steps starting out with severely simple models and adding a series of complications. Hence when one constructs a model of trade between countries A and B in which country A exports nothing but cotton and country B exports nothing but whiskey, or when one constructs a model of a business firm or of a trade union, one may or may not regard the model as closely representing reality. Models have the important advantage of requiring an explicit statement of assumptions. Model building helps to give precision to thinking, to force the thinker to recognize the limitations of his assumptions, to make distinctions which he might not otherwise make, and to recognize alternative possibilities which might otherwise escape his attention. At best, however, models can only produce hypotheses, propositions which *may* turn out to be consistent with a substantial volume of evidence.

During the last several decades economics has made impressive progress in adding to its intellectual tools, in increasing the volume of case studies, in building new and interesting models, and in developing important

hypotheses. This period has seen the development of indifference curve analysis, of the various concepts of monopolistic competition, of the Keynesian tools of income analysis. It has seen re-examination of the economics of the firm with the construction of models which assume cost curves and production functions very different from those previously used.

The great shortcoming of economics has always been its failure to take the last step in production of knowledge—to test hypotheses and thereby to develop propositions which have some generality and which have been found to be consistent with more or less substantial bodies of evidence. Economics falls short of its purpose when it produces merely observations about specific situations (case studies) or suppositions of the form that if A and B are true, then C is true. The tools and concepts of economics, its case studies, models, and hypotheses all have the ultimate purpose of helping to produce propositions which can be tested against evidence. Assertions which merely take the form of suppositions and of deductions from assumptions do not get one very far in understanding the way in which the economy operates or why economic behavior takes certain forms. Only when economists produce propositions of a general nature which stand up in the face of evidence do economists break out of the world of speculation and add to the knowledge of economic behavior.

The failure of economics to take the last step in the production of knowledge—to test its hypotheses and models and thus to convert them into observations—is well illustrated by the work of Keynes who had more influence on the thinking of economists than any other economist of his generation. The most influential work of Keynes, his *General Theory*, is a rich storehouse of concepts and analytical tools and yet it does not add a single verified proposition to the accumulated stock. It belongs to the realm of supposition rather than to the realm of observation. It is useful in suggesting problems to attack and in providing tools for attacking them, but the models which it uses are remote from reality. Keynes, for example, assumes a world in which there is no corporate saving. All decisions to save in his models are made by individuals. And yet corporate savings are large, may not follow the same rules followed by individual savings, do not necessarily have the same relationship to investment. Until the rules governing saving are known, the behavior of the economy cannot be satisfactorily explained.

One of the most important and interesting propositions of Keynes, which illustrates the unreality of his models, is his assertion that the proportion of incomes saved is ~~less~~ for large incomes than for small ones. There is abundant evidence to support this assertion. In order

to understand the operation of the economy, however, one needs to know what happens to savings as the flow of incomes grows or shrinks. The only way to find out is by observation. The Keynesian model sheds no light on the question, although many economists have assumed that Keynes was talking about the movement of incomes and savings during time when he was in fact merely making an assertion about the distribution of incomes and savings at a point in time. Theories of business cycles have been based upon the unsubstantiated assumption that as incomes increase or decrease, the ratio of savings to incomes increases or decreases.

As a matter of fact, no one knows what the relationship is between changes in the flow of income and changes in the flow of savings. There is scattered evidence on the subject, but it is not sufficiently abundant to verify a proposition. The scattered evidence suggests that in the early phases of expansion consumption increases faster than personal incomes and that in the later phases of expansion the reverse is true. Likewise, the evidence suggests that in the early phases of contraction consumption drops faster than personal incomes and in the later phases the reverse is true. Much more evidence is needed, however, before one knows the relationship between the flow of incomes and the flow of savings.

Why have economists placed so much emphasis upon case studies or the development of elaborate suppositions and why have they not devoted more time and effort to developing tested propositions? There are several reasons.

One reason is that many of the relationships in which economists have been most interested did not seem amenable to testing. Hence, economists developed the habit of using models instead of observations—setting up some assumptions which seemed more or less realistic and deducing behavior from them. This is a useful way of producing propositions to be tested but it is a poor substitute for observations because one never knows what one is leaving out.

A second reason for the failure of economists to break out of the realm of speculation and to develop tested propositions is that gathering evidence is slow, prosaic, sometimes even uninteresting, and frequently time consuming and expensive. The construction of a theory of business cycles, of prices, of wages, of foreign trade, is more interesting and in some respects easier than testing the theory. Certainly the construction of a theory appears to demand more originality and to give opportunity to display more insight and ingenuity than testing the theory, although as a matter of fact the demand for originality, insight, and ingenuity is virtually without limit in either case. Often the gathering of evidence or the analysis of evidence in significant amounts re-

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quires a team. There have been few organizations capable of doing that kind of work.

A third reason for the failure of economists to concern themselves with developing tested propositions has been the inadequacy of the available factual material. Few economic data are gathered to meet the specific needs of economists. Most of the facts used by economists, such as facts about population, the volume of exports or imports, the volume of money, deposits or credit, the amount of government expenditures or receipts, are gathered for various specific governmental purposes, not to meet the needs of economists. Although economics is particularly concerned with the national income and the national wealth, economics was a century and a half old before a real attempt was made to measure the national income and its components. Even today relatively little information is available about the distribution of income or the spending habits of different classes of income recipients. And economics still lacks a comprehensive series of balance sheets for the country, showing who owns what and who has what liabilities.

A fourth reason why economists have developed only a limited number of verified propositions has been the failure of economists to envisage the possibilities of this kind of work. Perhaps this is merely a repetition of the first reason. It is also a roundabout way of saying that the kind of thinking which economists do and the kind of activities which they pursue are governed in large measure by tradition and reflect, therefore, conditions of the past rather than the opportunities of the present.

The obstacles that have been limiting the development of tested propositions by economists have been becoming steadily less formidable and during the last generation great progress has been made in converting economics from a collection of hypotheses, suppositions, and speculations into a collection of observations. American economists have led the world in this respect. Among them, of course, the ground-breaking figure of W. C. Mitchell has towered over all others. Considerable progress has been made in identifying many regularities in the cyclical movements of production, prices, consumer expenditures (for example, the production of nondurable goods seems to turn upward or downward ahead of the production of durable goods, the prices of raw materials move earlier and more violently than the prices of finished goods); in the relationship between prices and costs (technological changes which reduce the amount of man-hours required to make goods seem in the main to raise money wages rather than to bring about a drop in prices); in the structure of wages (hourly earnings appear to be high where payrolls are

small in relation to receipts from sales and where profits per dollar of sales are large).

The prospects are bright that during the next decade or two even more rapid progress will be made in converting economics from a collection of suppositions and hypotheses into a comprehensive collection of tested propositions about economic behavior. There are several reasons for this belief. One is that the data needed to test propositions are steadily growing in abundance. A second is that the development of sampling enormously increases the possibility of obtaining needed data at relatively little expense. A third is that much of the research in economics is falling into the hands of government agencies, such as the Federal Reserve System, the Department of Commerce, the Department of Agriculture, the Council of Economic Advisers, which are responsible for administering policies or for giving advice on the formulation of policies. The suppositions of traditional economics are of little use in determining what policy to adopt or when to reverse a policy. Propositions based upon observations of actual economic behavior are necessary to guide policy making, although most policy decisions are themselves suppositions. A fourth is that the attitude of economists themselves toward mere model building is rapidly changing. Economists recognize that speculation about economic behavior on the basis of selected assumptions does not yield a very satisfactory product. One dare not regard the product as a description of reality because someone is likely to come along and show that real behavior is governed in the main by conditions which were not in the assumptions. More and more, therefore, the only kind of work which satisfies economists is that which represents observations of the operation of the economy.

The opportunities to develop tested propositions about economic behavior are so numerous that one can hardly hope to forecast the fields where the greatest progress will occur. Among the areas where observations of economic behavior are likely to be particularly successful in yielding general propositions are:

1. The spending habits of individuals. A good beginning has been made in this field, but it is only a beginning. For example, little is known about the disposition of individuals to postpone buying. Who does it, when, why, and for how long? Likewise little is known about the propensity of individuals to incur short-term debts. Who goes into debt, when, and why? What is the relationship between willingness to go into debt and one's expectations? Are people who have recently had increases in their income more likely to incur short-term debts than persons who have recently suffered decreases in their income? Little is known also

about the repayment of debts—who repays, when, why, and at what rate. In all of these types of behavior, regularities can doubtless be found and generalizations can be made about them.

2. The determinants of the birth rate of business enterprises. Who start enterprises and where does the money come from?

3. The determinants of the mortality rate of business enterprises. The mortality is heavy among new concerns, but little is known about it.

4. The investment habits of individuals—who invests in what and why. In the last decade or so, considerable information has been acquired concerning the general investing habits of individuals. It is known, for example, that individuals in nonwar years (1933 to 1941 and 1946 to 1948) have invested considerably more in unincorporated enterprises than in any other investment outlet; that residential building was second in importance; private insurance, third; cash and bank accounts, fourth. Direct investment in corporate securities by individuals was less than one-eleventh as much as their direct investment in unincorporated enterprises. But although much information has recently been gained concerning the relative importance of various outlets for the investment funds of individuals, little is known as to what kinds of persons prefer what kinds of investments and why. Little is known as to why individuals do so little direct investing in corporate industry—the most productive and promising part of American industry. Accurate information is lacking as to how many persons own stock in American corporations and who they are.

5. The relationship between wages and prices.

6. The reactions of managements to increases in wages. For example, under what circumstances is the net result of managerial reactions to wage increases inflationary; under what circumstances, deflationary?

7. The determinants of the structure of wages and of the movements of wages through time.

8. The determinants of the supply of labor. Who works and why? For how many persons is working or not working a close question? Does an increase in wages or in jobs increase or decrease the supply of labor?

9. The determinants of the frequency and severity of strikes. For example, why should the coal industry in New South Wales, England, the United States, and other countries produce so much more than its share of the time lost because of strikes? What regularities exist in the strike rates in different industries and what conditions are associated with them?

The above are only a few of the areas in which economics may be expected to develop tested observations during the next decade or two. The directions in which economics develops will be determined in large measure by the demands made by the community on economists. The principal demands, I suspect, will be two: how can the community avoid ups and downs in economic activity and how can it achieve a given rate of growth in production. Economists will not be able to answer these demands merely by giving the community models, hypotheses, and suppositions. They will need to be experts on the nature and causes of the wealth of nations, to be able to show the country what rate of production is within the range of practical possibility, to show the country how it can raise the rate of production from x per cent to $x + 1$ per cent or $x + 2$ per cent per year, how it can foster business births, how it can stimulate the accumulation of capital. Today the light that economics and economists can shed on such questions is not great. Twenty years from now, or even ten years from now, one may expect economics to be an important source of help on how the country can more rapidly raise its standard of living.

PACIFIC COAST ACTIVITIES OF THE COUNCIL: REPORT OF THE PACIFIC COAST REPRESENTATIVE, 1948-49

by Harold E. Jones

DURING the past year Council activities on the Pacific Coast have included the work of two interdisciplinary committees and two committees primarily in the field of economics; a conference on social welfare statistics; a conference on research on aging; several round tables sponsored in connection with meetings of Pacific Coast societies; and several smaller conferences on the organization of social science research in universities.

SOCIAL STATISTICS

The Pacific Coast Committee on Social Statistics is the older interdisciplinary committee. Its members are George M. Kuznets (chairman), Maurice I. Gershenson, Emily Huntington, Davis McEntire, and Calvin F. Schmid. During 1948-49 under the chairmanship of Mr. McEntire, it has given attention to crime statistics,

social welfare statistics, and plans for an inventory of projects and source materials in social statistics on the Pacific Coast.

The chief of the Statistical Bureau in the California State Department of Justice has consulted with the committee in exploring the status of statistical work in relation to crimes, arrests, and judicial and correctional processes. The committee is particularly concerned about the almost complete absence of research in this field on the Pacific Coast at the present time, although the expansion of teaching in criminology in the University of California and the activities of the California Governor's Crime Commissions are evidence of growing interest in the problems in the field, and the need for research is keenly felt in some quarters. An important barrier to the development of research in this area is the unsatisfactory condition of statistical reporting of crimes, criminals, and related data. Not only are the official statistics narrow in scope but even within their own limitations they are based, to a large extent, on loose and fluctuating concepts and an uneven quality of reporting which makes them largely valueless for research purposes. The committee has been impressed, nevertheless, with efforts being made in the law enforcement and correctional agencies of California to improve the quality of their records, and wishes to be of constructive service in the development of crime statistics.

In furtherance of social welfare research and statistics, the committee sponsored a conference on this subject in April 1949, with the purpose of exchanging information and formulating principal needs. These needs were defined as follows:

- (1) The improvement of research standards in privately supported social welfare agencies.
- (2) Assistance to statistical bureaus which collect routine operating data, in the selection of problems for special studies.
- (3) Periodic and timely statistics on the social characteristics of applicants for public aid, and the reasons for their dependency. It was the consensus of the conference that the collection and publication of such data should be made part of the regular statistical programs of the state public welfare agencies, and that further attention should be given to developing appropriate sampling methods for collecting such data.
- (4) Up-to-date statistics on consumption habits. The preparation of budgets for dependent families is at present handicapped by incomplete knowledge of changes which have occurred in consumption behavior since the last major study was made in 1934-36.

In 1944 the committee published an inventory of projects and sources in social statistics. This had a wide distribution on the Pacific Coast and elsewhere, and was so well received that when the committee was reconstituted in 1947 the decision was made to bring the earlier inventory up to date. Unfortunately no member of the committee has been in a position to undertake the project without assistance and the project remains on the committee's agenda.

COMMUNITY STUDIES

Newest of the four Pacific Coast committees is the second interdisciplinary group, the Committee on Community Studies, composed of Leonard Bloom (chairman), Allen L. Edwards, William S. Robinson, Calvin F. Schmid, Eshref Shevky, Robert C. Tryon, and Paul Wallin. In operation only two years, the group has been particularly active. During the year three reports were completed, dealing with materials and methodological problems which had been discussed in detail in previous meetings of the committee. These were a monograph by Eshref Shevky and Marilyn Williams, *The Social Areas of Los Angeles* (University of California Press, 1949); "The Differentiation of an Ethnic Group," by Leonard Bloom and Eshref Shevky, to be published in the *American Sociological Review*, August 1949; and a paper analyzing the technique of ecological correlation, by William S. Robinson, to be published in the same journal.

A meeting of the committee was held in San Jose, California, in April 1949, in conjunction with the annual meeting of the Pacific Sociological Society. Research in progress on the typology of cities was reported by Calvin F. Schmid; and by Leonard Bloom, on the homogeneity of census tracts and the design of locality samplings, based on enumeration district data.

Under the chairmanship of Robert C. Tryon and later of Leonard Bloom, meetings of this committee have involved a systematic consideration of methods applicable to the study of communities, in the light of their application in a number of Pacific Coast communities. The committee is now planning the preparation of a memorandum on methodological problems of community research.

LABOR MARKET RESEARCH

Under the chairmanship of Clark Kerr and with Paul A. Dodd, Maurice I. Gershenson, Robert D. Gray, William S. Hopkins, John P. Troxell, and Edgar L. Warren as members, the Pacific Coast Committee on

Labor Market Research has continued the development and organization of the following major projects:

- (1) Cooperative collection of basic industrial relations documents,
- (2) Discussion of industrial relations research programs of the several Pacific Coast university research centers,
- (3) Publication and distribution of a memorandum on the organization and projects of the Pacific Coast research centers active in the field, and
- (4) Sponsorship of two industrial relations research conferences.

In the area of library coordination the aim of the committee has been to procure, with existing facilities, the largest possible collection of industrial relations documents while at the same time avoiding unnecessary duplications. Fields of concentration in the collection of these documents have been designated for each of the five centers. A uniform classification system is also being developed to facilitate exchange of library materials among the centers. Development of this program is being completed on the following major categories of industrial relations literature:

- Employer documents and periodicals,
- Union documents and periodicals,
- Masters' theses and doctoral dissertations dealing with the field of industrial relations.

With respect to the discussion of research programs, the committee has continued its policy of scheduling meetings at the various West Coast research centers so that staff personnel actively engaged in research could participate in discussions. At the August 1948 meeting of the committee at Stanford University, staff members of the Division of Industrial Relations joined the committee to discuss research in progress at Stanford.

A memorandum describing the organization and projects of the five Pacific Coast research centers was published by the committee in the summer of 1948 and distributed by the various centers to labor unions and management associations in their respective territories. It was also sent to national labor and management groups as well as industrial relations centers in other parts of the United States.

One session of the August meeting was devoted to the discussion of subjects of vital interest in industrial relations. During the discussion the participants suggested specific research projects which might be undertaken on these subjects. In addition to committed members and staff personnel of the centers at Stanford and Berkeley, the following guests were present at this session: Edward H. Chamberlin, John T. Dunlop, and Seymour E. Harris of the Department of Economics,

Harvard University; Joseph S. Davis of the Food Research Institute, and Edward K. Strong, Jr. of the Department of Psychology, Stanford University; Edwin E. Witte of the Department of Economics, University of Wisconsin; and George W. Zinke of the Department of Economics, University of Colorado.

At the committee's December meeting in Los Angeles, reports on industrial relations work at the University of Denver and the University of Oregon were given by Theodore H. Cutler of the Department of Psychology at Denver and Paul L. Kleinsorge of the Department of Economics at Oregon. Grace Heilman of the Haynes Foundation also reported to the committee on the Foundation's extensive study of California labor history.

Three research conferences were arranged by the committee in 1948-49. A round table discussion at the Pacific Coast Economic Association's annual meeting at Los Angeles in December was sponsored jointly by the committee and the Association.

PRICE POLICIES

The members of the Pacific Coast Committee on Price Policies are Leonard A. Doyle (chairman), J. S. Bain, Ralph Cassady, Jr., E. T. Grether, John A. Guthrie, Roy W. Jastram, Vernon A. Mund, and Robert B. Pettengill. Mr. Jastram was moderator of a panel discussion of West Coast industrial price policies at the December 1948 meeting of the Pacific Coast Economic Association, at which Mr. Doyle presented a paper on "Aluminum Prices in the Postwar Period." Mr. Doyle also presented a paper on "How Can Economic Theory Help the Cost Accountant?" at the November meeting of the San Francisco Chapter of the National Association of Cost Accountants; a part of this paper appeared in the December issue of the *N.A.C.A. Bulletin*.

Two papers by Mr. Jastram on topics which had been discussed at the May 1948 meeting of the committee were published during the year: "Advertising Outlays under Oligopoly" in the May 1949 issue of the *Review of Economics and Statistics*, and "Advertising Ratios Planned by Large-Scale Advertisers" in the July 1949 issue of the *Journal of Marketing*. A report on the "Economics of the Pulp and Paper Industry," which was also one of the principal topics of the May 1948 meeting, was recently completed by John A. Guthrie. Other related studies now in progress are a project by J. S. Bain to test the correlation between certain characteristics of market structure and associated price output in representative manufacturing industries, and a study by Vernon A. Mund involving an analysis of the basing point system and the problem of freight absorption.

The annual meeting of the committee, originally planned for May, has been postponed until September in order to make use of the services of consultants who will be in the Bay Area at that time. This meeting, under the chairmanship of Mr. Doyle, will include reports on research by committee members, and a consideration of the basing point price system.

CONFERENCE ON RESEARCH ON AGING

Under the chairmanship of the Council Representative, a conference on research on age changes was held in Los Angeles on June 14, 1949. This conference was planned with the purpose of bringing together persons interested in various phases of research on later maturity, on the process of aging, and on the economic and social consequences of changes in the age composition of the population. Economics, political science, psychiatry, psychology, sociology, and also endocrinology, public health, and zoology were among the fields represented by the seventeen participants. Reports were given concerning research interests in seven institutions; at four of these (Stanford, Claremont Colleges, and the University of California at Berkeley and at Los Angeles) considerable preparatory work had been done in planning long-term programs. Plans are being made for a second conference to be held next spring, and for developing other means of furthering the exchange of information and evaluation of plans for interdisciplinary research in this field on the Pacific Coast.

OTHER ACTIVITIES

Since the 1947 conference on minority studies, the Pacific Coast office of the Council has maintained contact with individuals and groups engaged in the study

of minorities, attitudes toward minorities, and race relations. Subsequent publications by participants in the 1947 conference include Else Frenkel-Brunswik's "A Study of Prejudice in Children" in the August 1948 issue of *Human Relations*, and Leonard Bloom and Ruth Riemer's *Removal and Return: The Socio-Economic Effects of the War on Japanese Americans* (University of California Press, 1949).

In previous years reports on current projects in the social sciences and on the coordination of social science research have been made before various West Coast organizations. The Council Representative continued this series of addresses, in reports made at annual meetings of the Western Governmental Research Association and of the Pacific Sociological Society. Some effort has been devoted to participation in the work of Council committees, including interviewing fellowship candidates, data collection in connection with the revision of the tentative directory of university social science research organizations, and arrangements for conferences in Los Angeles, Berkeley, and Seattle for the Committee on Housing Research.

In visiting universities and colleges in California and the Northwest, first steps were taken toward a survey of research opportunities, and personnel resources for research, in smaller institutions. In such institutions it is not uncommon to find one or more faculty members who have had social science research experience in another university, or in a government agency, and who have specific research interests which they wish to continue. The conditions under which they are serving are, however, often unfavorable to professional activities other than teaching. Consideration has been given to a possible conference or series of conferences at which this problem can be discussed with college administrators.

SOCIAL IMPLICATIONS OF TECHNOLOGICAL CHANGE

by Yale Brozen

ATOMIC energy has dramatically forced public thinking and public policy to give new and serious consideration to technological change, for the issues raised by atomic energy differ in degree only from issues raised by other technological developments. As the studies sponsored by the Social Science Research Council's former Committee on Social Aspects of Atomic Energy progressed, it became increasingly apparent that further fruitful work on these aspects would depend upon development of the field of technological change as a

body of knowledge coordinate in stature with such fields as land economics or labor economics.¹ It may

¹ See the statement by Pendleton Herring in the March issue of *Items*; also, pp. 34-35, *infra*. The studies sponsored by the former committee are: Leonard S. Cottrell, Jr. and Sylvia Eberhart, *American Opinion on World Affairs in the Atomic Age* (Princeton University Press, 1948); Ansley J. Coale, *The Problem of Reducing Vulnerability to Atomic Bombs* (Princeton University Press, 1947); Cowles Commission for Research in Economics, "Atomic Power in Selected Industries" (in process). The present statement summarizes a preliminary formulation presented to the Committee on Economic Growth in June. It is part of a more extensive formulation to be presented to the Committee on Social Implications of Atomic Energy and Technological Change in the fall.

prove necessary to develop an interdisciplinary approach within universities, comparable with that of institutes of industrial relations, in order to assure the full contribution of social science and engineering departments to knowledge of the effects of technological advance.

GROWTH PATTERNS AND TECHNOLOGICAL CHANGE

In studying technological change, its determinants, its consequences, and its control, it is fruitful to approach the topic in terms of historic sequences of industrialization and of sequences appropriate for development of a backward area in the modern world. These sequences furnish clues to the determinants of the relationship of technological possibilities to the level of techniques used by enterprises which are technological leaders, and the relationship of both of these to the level of the technology of the economy. Since technological change is the change in these three levels, observation of their historic development and examination of their appropriate relationship in modern settings will provide data relevant to any analysis of the causes, consequences, and value of improving techniques. From such data we can learn something of the conditions under which atomic energy is likely to be introduced, what its consequences are likely to be, and what methods of social control will most effectively produce desired results.

To illustrate the value of studies of growth patterns, let us examine some of the forces affecting technology that might be revealed by such a procedure. Resource patterns and priority of wants have been important determinants, historically, of sequences in the development of technology, in techniques used, and in industrial growth. The priority of wants dictated the development of sources of food, first, and in some climates sources of warmth (clothing, shelter, and heat). Resource patterns and technology dictated the type of development, although technology was partly the *result* of the resource and want pattern. As long as population was small and technology poor, land-intensive (large amount of land per unit of product) techniques utilizing low-level skills were devised and used. As population pressure and technology grew, food production may have turned from land-intensive, low-skill methods such as foraging for berries and dead game to less land-intensive, more skill-intensive methods such as trapping or hunting game. Technological development may have been induced, autonomous, or a combination of both. When technologic growth drew ahead of subsistence requirements, or when population-

resource ratios declined, men could turn to the development of industry supplying secondary wants.

To turn from speculative history to more recent events, the modern chronicle seems to furnish evidence for the thesis that industry requiring low-level skills and providing low-level skill training must develop first. Such industry must use techniques involving a low ratio of capital to product when developed in regions or eras of scarce capital. The less capital-intensive techniques and industries using such techniques come first. These generate the skills and capital which make possible the growth of higher-level industry. The development of the Carolina Piedmont, for example, was from farming² and labor about the home to textiles to higher levels. The textile industry has been the great "low level" educator. Out of such developments grow complex technologies.

The growth of skill and "westernization" of the labor force probably should be divided into two distinct categories. Handicraft skills may develop to fairly high levels and handicraft industries may become more capital-intensive with growth. Scarce capital, poor technology, or limited markets may dictate handicraft methods. The jump to inanimate power and nonhandicraft techniques usually involves a great jump in capital intensity and a decrease in labor and skill intensity at the operating level. The growth in skill intensity must begin again.

Income and market factors as well as resource patterns (labor, its skill composition, and its work attitudes are included in the resource pattern) and technology are important determinants of the sequence of events. Before resources can be released from subsistence industries (agriculture), the per capita efficiency of those industries must be improved. This has been brought about by such factors as a reduction of population relative to resources (Black Death), by improvement of techniques (agricultural revolution), by interconnection of areas and specialization in relatively more efficient industries in each area (rise of the sheep industry in England), and by increased supplies of capital (modern U. S. agriculture).

The undeveloped area in the modern world need not concern itself with developing industry according to the priority of wants. For it, resource patterns and technology are important. It is more efficient to use a land-intensive development such as iron ore mining in an underpopulated area like Labrador than it is to grow food. Foodstuffs can be obtained with less expenditure

² Farming may vary from a low skill-, low capital-, or low land-intensive industry to high skill-, capital-, or land-intensive industry, depending on the techniques used. Development may take place within an industry as well as through a succession of industries.

of resources, under the pattern of available techniques, by mining ore and exchange with other areas. Similarly, a backward area can develop a capital-intensive industry since it competes with capital-rich industries of other areas for capital rather than with capital-poor industries in its own area. To the extent that capital markets are imperfect or political instability prevails, this does not apply. Also, to the extent that interregional commodity flows are barred, priority of wants will govern regional development.

Finally, the sequence of industrial development depends upon the relationship of external economies. As long as transport is crude, small-scale operations appropriate to a local market will prevail. Typically, small-scale production tends to be labor-intensive. Capital may be abundant, but its outlet is in consumer-durable goods and conspicuous display. The building of a bridge may connect markets (as in a recent instance in Liberia) and permit the growth of specialization and of large-scale, capital-intensive industry. The state of development of services such as transport, electric power, water supply, etc. is both consequence and determinant of industrial development.

Thus, we have a set of elements or concepts (skill, labor, capital, and land intensities, priority of wants, resource patterns, market size, and specialization and indivisibilities, i.e., potentialities of external economies) and some generalizations as to their relationships in a time sequence. These elements and their relationships should be tested by an analysis of history (by studies of comparative industrialization such as those proposed by the Council's Committee on Economic Growth) and by a theoretical examination of the optimum combination of elements. The former may suggest some oversights and provide hypotheses for the latter; the latter will provide us with a framework for policy making.

To the extent that social forces operated in a proper framework, we may have had development in a nearly optimum fashion with men unconscious of any deliberate intent. To the extent that we are more consciously making decisions on an economy-wide scale in the management of our society (as in the case of atomic energy), social forces do not automatically provide policy-making criteria that can be depended upon.

DETERMINANTS AND CONSEQUENCES OF TECHNOLOGICAL CHANGE

In the planning of research on technological change, we are concerned with historic patterns of industrialization and optimum sequences in the development of a region. Our primary concern, however, is with the factors determining the rate of growth of technology

(knowledge), its rate of application, and its consequences. Deliberate social policy is becoming more and more involved with making decisions such as the proportion of resources to be devoted to research, the proportion to be devoted to incorporating the results of research in the production organization, and the measures to be undertaken for the mitigation of consequences of innovation (worker displacement, skill obsolescence, falling farm prices, changes in military potential and international relationships, etc.).

To make such decisions we must know more about the productivity of expenditures on research, the determinants of the rate of adoption of research results, and the effect of technological change on the rate of investment, the level of income, and the division of income. The impact of technological change on value conceptions and value realization, on social organization, and on consensus in the community must also be measured, although such measurements are most difficult. Also, the causes of disparities between social and private costs of technological change and social and private benefits must be found and the means designated for reducing the size of the disparities, where that is indicated, or offsetting them, where the latter is the appropriate policy. Only then can we determine optimum rates of research and of technological change.

Problems of technological change have been treated as a part of the labor problem, the land problem, the cycle problem, or the problem of social disorganization. Changing patterns of labor and land utilization were treated as such with little attempt to isolate the shifting state of the arts and segregate its effects or devise policies to treat it apart from other causes of difficulties. It is important that we learn to segregate technological change and its consequences. Treating it as a part of other problems results in social devices which miss their objectives because of the resulting confusion. The problem of the worker displaced by the decline of his company or the decline of his region, for example, is different from that of a worker displaced by a new technique which has made his skill obsolete. Such devices as labor market information, employment agencies, or subsidized migration are appropriate for the former case. These do not solve the difficulties of the latter case. The problem of atomic energy is not simply a military problem and cannot be handled with the same techniques that are used for military problems.

The total examination of the field of technological change will require a team approach. Only by combining the work of economists, sociologists, psychologists, political scientists, and other specialists can the total cost and total effect of any given change be

measured. In forecasting the consequences of a future change in a particular industry, engineers must evaluate the extent of cost saving involved before economists can venture to predict the extent of the change and the amount of shift in the ratio of resources available to other industries. After such prediction, engineers must be recalled to determine the shift in pattern of techniques used in other industries. Then these secondary consequences can be evaluated. The engineers

must also furnish the sociologists and psychologists with some notion of the change in skill requirements, work patterns, and changes in working relationships involved in the adoption of new techniques.

After the efforts of these specialists are combined, we will have the relevant data for the kinds of decisions that are attempted in modern social organizations. To combine these efforts, however, will require the invention of a structure for merging them.

COMMITTEE BRIEFS

ECONOMIC GROWTH

Simon Kuznets (chairman), J. M. Clark, Edgar M. Hoover, Wilbert E. Moore, Morris E. Opler, Joseph J. Spengler.

A preliminary canvass of personnel and institutions interested in empirical research on long-term changes in larger social units was reviewed by the committee at its second meeting, held on June 13, 1949. At the invitation of the committee Yale Brozen discussed the report which he is preparing for the Committee on Social Implications of Atomic Energy and Technological Change, and its relation to the field of interest of the Committee on Economic Growth. His remarks are summarized in the preceding article (pp. 31-34). At the committee's invitation also, Carl Remer described plans being developed at the University of Michigan for study of the economic development of Japan. The committee's review included consideration of current and prospective research activities of world area institutes, the interests of various government agencies in regional studies, and discussion of a memorandum by Wilbert Moore on sociological factors in economic growth. Replies to a letter of inquiry, sent by the chairman of the committee to some twenty scholars, indicate a vigorous interest in the study of long-term economic growth, a variety of current studies of particular countries and areas, and an expected emphasis on present-day problems—such as the industrialization of underdeveloped countries. At the same time there seems to be little unanimity with respect to a theory of economic development, standards for quantitative measurement, basic concepts, or relative importance of factors. The committee has taken account of this situation in formulating its program. It is proceeding to delineate the various sectors of its field and enlisting the cooperation of groups of scholars for exploratory surveys of research possibilities in each sector.

ECONOMIC HISTORY

Arthur H. Cole (chairman), Earl J. Hamilton, Herbert Heaton, John G. B. Hutchins, Harold A. Innis, Leland H. Jenks, Edward C. Kirkland, Frederic C. Lane, Robert Warren.

Two further volumes in the series of "Studies in Economic History" sponsored by the committee are scheduled for fall publication by the Harvard University Press: a history of the business corporation in New Jersey prior to 1875 by John W. Cadman, Jr., in November; and "Steamboating on the Western Rivers" by Louis C. Hunter, in December. The committee is participating in the preparation of a book of readings on the scope and methods of economic history to be published next year by the Economic History Association and the American Economic Association jointly. Frederic C. Lane will serve as editor of the volume, and the committee will contribute to the cost of preparing its contents, including the translation of materials from foreign journals.

Acting on behalf of the organization entitled the "Friends of Edwin F. Gay," the committee is taking responsibility for the preparation of a memoir of Gay. Herbert Heaton has been collecting data on Gay's career for the past eighteen months and has the manuscript substantially completed; he plans to submit it to the committee before the end of the summer. The memoir will be published by the "Friends of Edwin F. Gay," with acknowledgment of the relationship of the committee to the development of the volume. A. H. C.

SOCIAL IMPLICATIONS OF ATOMIC ENERGY AND TECHNOLOGICAL CHANGE

Ansley J. Coale (chairman), Harold J. Barnett, J. Frederic Dewhurst, Tjalling C. Koopmans, Wassily W. Leontief, W. Rupert Maclaurin; staff, Yale Brozen.

The origins of the present phase of the Council's explorations in the broad field with which this committee is concerned were outlined in an article in the March issue of *Items*. The committee was appointed in April. Yale Brozen, whose full-time services as staff were obtained for the spring and summer terms, at that time began a systematic canvass of the relevant literature, current research, and personnel interested in its further development. He has in preparation an appraisal of the present state of knowledge and theory concerning the economics of technological change—taking account of the conclusion, reached at the Council's December conference on planning research in this area, that the

implications of atomic energy can be analyzed meaningfully only in the light of more adequate understanding of the process of technological change as a whole. The scope of his projected memorandum, which is concerned primarily with the determinants and consequences of technological change, was discussed with the committee at a meeting on May 20. The document is scheduled for completion early in the autumn.

SOUTHERN ASIA

(Joint with the American Council of Learned Societies)

W. Norman Brown (chairman), Kingsley Davis, Franklin Edgerton, John F. Embree, Holden Furber, David G. Mandelbaum, Horace I. Poleman, Lauriston Sharp.

The committee was appointed in April, upon the recommendation of the former ACLS Committee on Indic and Iranian Studies and of the SSRC Committee on World Area Research, for the purpose of appraising American studies relating to India, Pakistan, and Southeast Asia and making plans for their further development. The new

joint committee succeeds the ACLS Committee on Indic and Iranian Studies, which had broadened its scope and membership in response to increasing wartime and postwar interests in social science research relating to India and neighboring countries. Southern Asia is understood as the area from the Pamirs to the Pacific, comprising Afghanistan, Pakistan, India, Nepal, Bhutan, Ceylon, Burma, Indo-China, Siam, Malaya, Indonesia, and the Philippines. The range of interest of the joint committee includes ancient and modern languages and literatures, art, archaeology, philosophy, anthropology, economics, geography, history, political science, and sociology.

For its first project the committee has undertaken to survey the present status of studies relating to Southern Asia in the United States in terms of immediate and future resources and needs. It will also consider proposals for improving methods of research and training in the field, developing new lines of research, overcoming practical difficulties encountered in obtaining and using necessary materials, facilitating exchange of academic personnel, and similar problems.

PERSONNEL

RESEARCH TRAINING FELLOWSHIPS

The Committee on Social Science Personnel—Fred Eggan (chairman), Donald T. Campbell, Edward P. Hutchinson, Philip E. Moseley, Frank A. Southard, Jr., and Paul Webbink—has awarded six research training fellowships in addition to those previously announced. The new awards are as follows:

Allen H. Barton, Ph.D. candidate in sociology, Columbia University, for research on sociological problems of economic planning in Norway.

Donald C. Cutter, Ph.D. candidate in history, University of California, for study in Mexico and the United States of the exploration of the Central Valley of California in the Spanish, Mexican, and American periods.

Ralph M. Goldman, Ph.D. candidate in political science, University of Chicago, for a history and analysis of the role of the National Committee Chairman in American party politics.

Donald C. Pelz, Ph.D. candidate in social psychology, University of Michigan, for study of the effects of supervisors' attitudes and practices on the satisfactions of employees in a large public utility.

Marina Salvin, Ph.D. candidate in international relations and law, Columbia University, for research in Europe on Soviet expansion in the Balkans.

Robert Solow, Ph.D. candidate in economics, Harvard University, for training and research in analysis of economic time series and income distributions.

AREA RESEARCH TRAINING FELLOWSHIPS AND TRAVEL GRANTS

The Committee on Area Research Training Fellowships—Philip E. Moseley (chairman), Cora Du Bois, Merle Fainsod,

Robert B. Hall, Thorsten Sellin, and Charles Wagley—since making the appointments listed in the June *Items* has awarded two additional fellowships and one travel grant, as follows:

Robert W. Kerwin, Ph.D. candidate in international relations, School of Advanced International Studies, for research in Turkey on the financial organization of the Turkish industrial economy.

William D. Schorger, Ph.D. candidate in anthropology, Harvard University, for anthropological research in the Near East combined with part-time teaching at the American University of Beirut.

Amry Vandenbosch, Professor of Political Science, University of Kentucky, a travel grant for study of postwar political developments in Indonesia and other parts of Southeast Asia.

APPOINTMENTS TO COMMITTEES

Bert J. Loewenberg of Sarah Lawrence College has been named acting chairman of the Committee on Historiography during Ralph E. Turner's absence from the country in 1949-50.

Jacob H. Beuscher of the University of Wisconsin has been appointed to the Committee on Housing Research.

A. R. Bellinger of Yale University and Horace M. Miner of the University of Michigan have succeeded Carl W. Blegen and Fred Eggan as members of the Committee on International Exchange of Persons (joint with the ACE, ACLS, and NRC).

James W. Angell of Columbia University has been appointed to the Committee on International Relations Research.

Dale Yoder of the University of Minnesota has been named chairman of the Committee on Labor Market Research, succeeding J. Douglas Brown (resigned as chairman).

Donald Young of the Russell Sage Foundation has been named a member of the Natural Science - Social Science Fellowship Board (joint with the NRC).

George E. Taylor of the University of Washington has been appointed to the Committee on World Area Research, succeeding Walter L. Wright, Jr. (deceased).

PUBLICATIONS

BOOKS

Studies in Social Psychology in World War II, Vol. I, The American Soldier: Adjustment During Army Life by S. A. Stouffer, E. A. Suchman, L. C. DeVinney, S. A. Star, and R. M. Williams, Jr.; Vol. II, *The American Soldier: Combat and Its Aftermath* by S. A. Stouffer, A. A. Lumsdaine, M. H. Lumsdaine, R. M. Williams, Jr., M. B. Smith, I. L. Janis, S. A. Star, and L. S. Cottrell, Jr.; Vol. III, *Experiments on Mass Communication* by C. I. Hovland, A. A. Lumsdaine, and F. D. Sheffield. Prepared under the auspices of the Committee on Analysis of Experience of Research Branch, Information and Education Division, ASF. Princeton: Princeton University Press, 1949. Vol. I, 612 pp.; Vol. II, 676 pp.; together, \$13.50; separately, \$7.50. Vol. III, 356 pp., \$5.00.

Historical Statistics of the United States, 1789-1945: A Supplement to the Statistical Abstract of the United States. Prepared by the Bureau of the Census with the cooperation of the Committee on Economic History and the Advisory Committee on a Source Book of Historical Statistics. Washington: Government Printing Office, 1949. 371 pp. \$2.50. Orders should be addressed to the Superintendent of Documents, Washington 25, D. C.

Personal Adjustment in Old Age by Ruth Shonle Cavan, Ernest W. Burgess, Robert J. Havighurst, and Herbert Goldhamer. Report of a study initiated under the auspices of the former Committee on Social Adjustment in Old Age. Chicago: Science Research Associates, 1949. 217 pp. \$2.95.

Social Areas of Los Angeles: Analysis and Typology by Eshref Shevky and Marilyn Williams. Related to the work of the Pacific Coast Committee on Community Studies. Berkeley: University of California Press, 1949. Published for the Haynes Foundation. 188 pp. \$4.00.

Workers Wanted: A Study of Employers' Hiring Policies, Preferences, and Practices in New Haven and Charlotte by E. William Noland and E. Wight Bakke. Sponsored by the Committee on Labor Market Research. New York: Harper & Brothers, 1949. 244 pp. \$3.00.

SSRC BULLETIN SERIES

The Pre-election Polls of 1948: Report to the Committee on Analysis of Pre-election Polls and Forecasts, Bulletin 60, by Frederick Mosteller, Herbert Hyman, Philip J. McCarthy, Eli S. Marks, David B. Truman, with the collaboration of L. W. Doob, Duncan MacRae, Jr., F. F. Stephan, S. A. Stouffer, S. S. Wilks. September 1949. 416 pp. Paper, \$2.50; cloth, \$3.00.

Labor-Management Relations: A Research Planning Memorandum, Bulletin 61, by John G. Turnbull. October 1949. About 130 pp. \$1.25.

All numbers in the Council's bulletin and pamphlet series are distributed from the New York office of the Council.

MEMORANDA

Research on Labor-Management Relations: Report of a Conference Held on February 24-25, 1949, at the Industrial Relations Section, Princeton University by Charles A. Myers and John G. Turnbull. Sponsored by the Committee on Labor Market Research. 37 pp. Mimeographed. Obtainable from the New York office of the Council.

Research on Wages: Report of a Conference Held on February 21-22, 1948, at the Littauer Center, Harvard University by Lloyd G. Reynolds. Sponsored by the Committee on Labor Market Research. 26 pp. Mimeographed. Obtainable from the New York office of the Council.

Memorandum on University Research Programs in the Field of Labor 1949 by the Committee on Labor Market Research. Washington: Social Science Research Council, 1949. 58 pp. Photo-offset. Obtainable from the Council's Washington office, 726 Jackson Place, N. W.

Work Measurement in Public Libraries: A Report to the Director of the Public Library Inquiry by Watson O'D. Pierce. 243 pp. Mimeographed. \$1.00. Obtainable from the New York office of the Council.

SOCIAL SCIENCE RESEARCH COUNCIL

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